FIG. 1

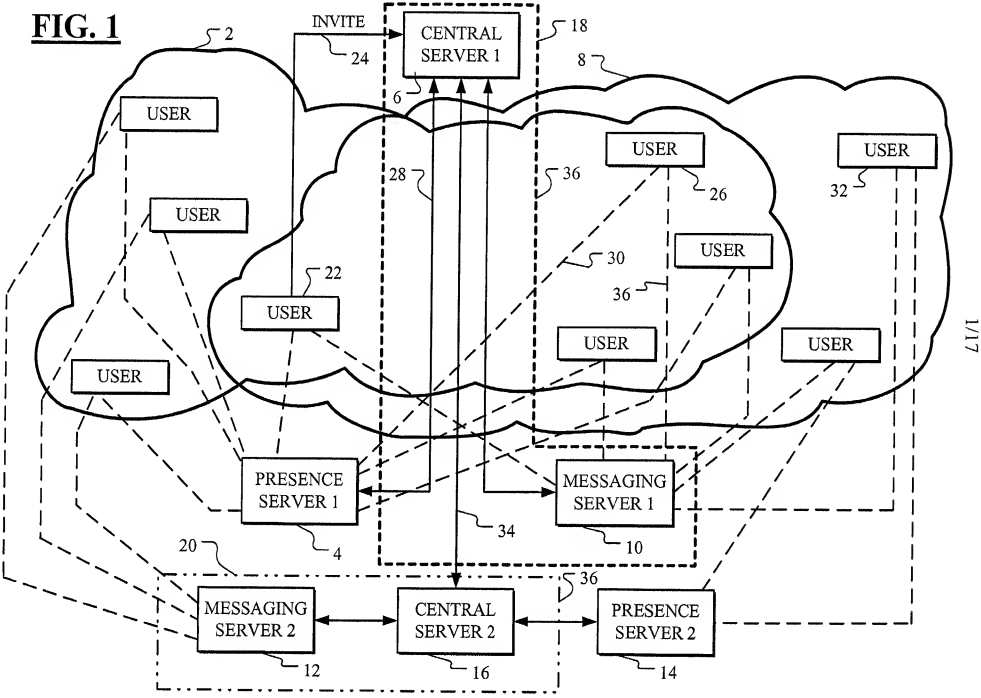


FIG. 2

REGISTER sip: Request-URI SIP/2.0
Via: **SIP/2.0/UDP IP address**
From: **sip: public address [user@domain]**
[E.164 address@CSCFdomain; user=phone]
To: **sip: public address [user@domain]**
[E.164 address@CSCFdomain; user=phone]
Call-ID: **local-ID@host**
CSeq: **1 REGISTER**
Contact: **<sip:user@IP address:port; transport=udp/tcp>**
Authorization: **UMTS <RES value in HEX format>**
Content-Length:**X**
Expires: **delta-seconds**
Content-type: **presence/TID**

<urn:namespace-xyz:car=abc-888,
registration-state=nnn,owner=mike.lee,
nationality=xyz,id=221161-3355,
email=mike.lee@hardcom.com,
pstn=+358405021988.....>

FIG. 3

REGISTER sip: i-cscsf.nokia.com SIP/2.0
Via: **SIP/2.0/UDP i-cscf.nokia.com**
From: **sip: Road_user@CSCFdomain; user=phone**
To: **sip: Road_user @CSCFdomain; user=phone**
Call-ID: **my_host@host**
CSeq: **1 REGISTER**
Contact: **<sip:joe@nokia.com:5060; transport=udp>**
Authorization: **UMTS <RES value in HEX format>**
Content-Length:**X**
Expires: **delta-seconds**
Content-type: **application/TID**
&
****

ENCRYPTED

urn:namespace-xyz:car=abc-888,registration-
state=nnn, owner=mike.lee,
nationality=xyz,id=221161-3355,
email=mike.lee@hardcom.com,
pstn=+358405021988
****

INVITE sip: i-cscsf.nokia.com SIP/2.0
Via: **SIP/2.0/UDP i-cscf.nokia.com**
From: **sip: Road_user@CSCFdomain; user=phone**
To: **sip: Road_user @CSCFdomain; user=phone**
Call-ID: **my_host@host**
CSeq: **1 INVITE**
Contact: **<sip:joe@nokia.com:5060; transport=udp>**
Authorization: **UMTS <RES value in HEX format>**
Content-Length:**X**
Expires: **delta-seconds**
Content-type: **service-request/NML**

< Here is defined a XML script defining the type of service requested in this session following a Nokia based XML DTD>

FIG. 4

Datum	- WGS84	(Mandatory)
Coordinates	- Latitude - Longitude - Altitude above WGS84 reference ellipsoid - Altitude above mean sea level	(Mandatory) (Mandatory) (Optional) (Optional)
Location Accuracy	- Horizontal accuracy, by radius of a circle from the positioned point - Altitude accuracy, by range from the positioned point	(Optional) (Optional)
Time	- Real time of the measurement/fix	(Mandatory)
Speed	- Ground speed - Vertical speed	(Optional) (Optional)
Direction	- Direction of movement	(Optional)
Course	- Direction from the current position to a defined destination	(Optional)
Orientation	- Horizontal orientation – Vertical orientation (pitch)	(Optional)
Un-specified Attributes	- Attributes enabling some extensibility	(Optional)

FIG. 5

FIG. 6

```
<SL-info>
    <Header>
        <TID>
            urn:username@company.com, owner=jose,id=2342112,
            email=jose.Costa-Requena@nokia.com, pstn=+358405201815
        </TID>
        <Security: 10/>
        <Transparency: 0/>
        <Signature: aZWQAd22aFg&"£4/>
        <Time-to-Live: 3000 sec>
    </Header>
    <Body>
        <Location-description>
            I am sitting in a terrace at second floor of Eiffel Tower
        </Location-description>
        <Accuracy: 5m/>
        <Device-Type: mobile/>
        <Device-Status: moving/>
        <Device-Staticy: 7/>
        <Coordinates-calculation: Enabled/>
        <Coordinates-coding: SGML/>
        </Coordinates-data>
            Here comes a SGML script indicating geographical coordinates x,y,z
        <Coordinates-data>
    </Body>
</SL-info>
```

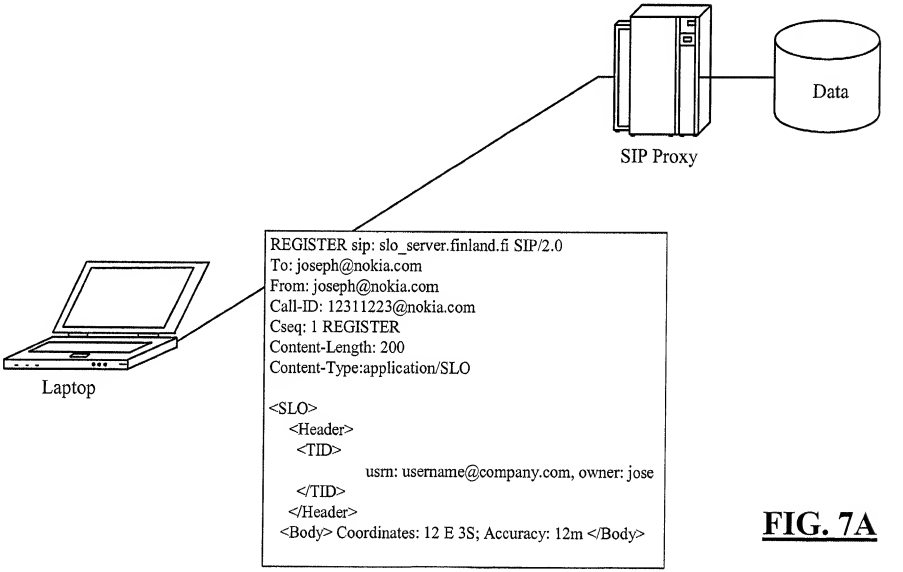

Data
SIP Proxy
Laptop
REGISTER sip: slo_server.finland.fi SIP/2.0
To: joseph@nokia.com
From: joseph@nokia.com
Call-ID: 12311223@nokia.com
Cseq: 1 REGISTER
Content-Length: 200
Content-Type:application/SLO
<SLO>
<Header>
<TID>
usrn: username@company.com, owner: jose
</TID>
</Header>
<Body> Coordinates: 12 E 3S; Accuracy: 12m </Body>

FIG. 7A

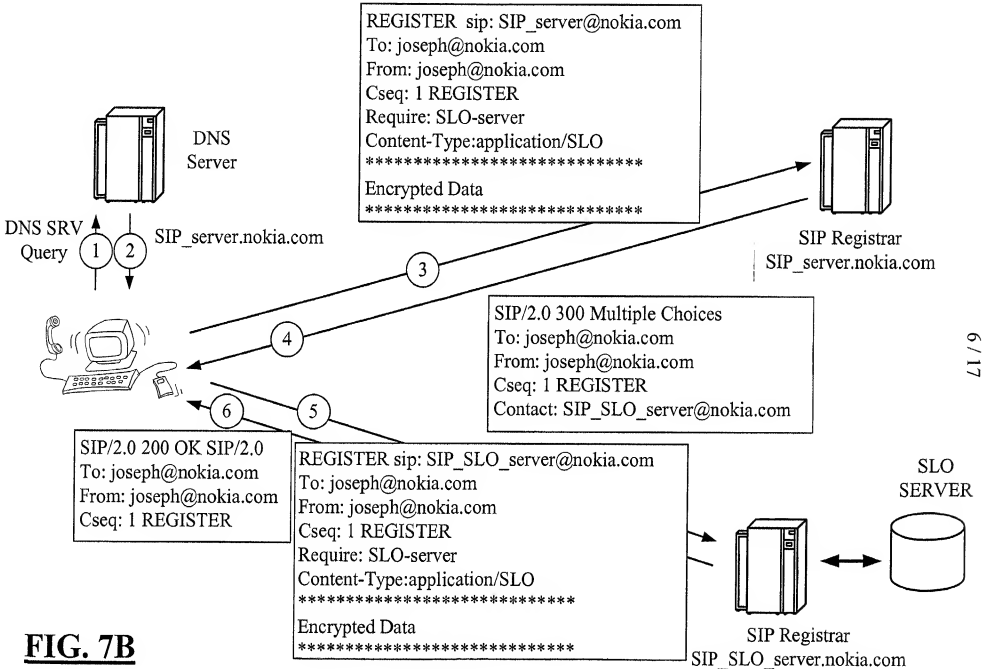

REGISTER sip: SIP_server@nokia.com
To: joseph@nokia.com
From: joseph@nokia.com
Cseq: 1 REGISTER
Require: SLO-server
Content-Type:application/SLO
****
Encrypted Data
****
DNS Server
DNS SRV Query
1
2
SIP_server.nokia.com
SIP Registrar
SIP_server.nokia.com
3
4
SIP/2.0 300 Multiple Choices
To: joseph@nokia.com
From: joseph@nokia.com
Cseq: 1 REGISTER
Contact: SIP_SLO_server@nokia.com
6
5
SIP/2.0 200 OK SIP/2.0
To: joseph@nokia.com
From: joseph@nokia.com
Cseq: 1 REGISTER
REGISTER sip: SIP_SLO_server@nokia.com
To: joseph@nokia.com
From: joseph@nokia.com
Cseq: 1 REGISTER
Require: SLO-server
Content-Type:application/SLO
****
Encrypted Data
****
SLO SERVER
SIP Registrar
SIP_SLO_server.nokia.com

FIG. 7B

FIG. 7C

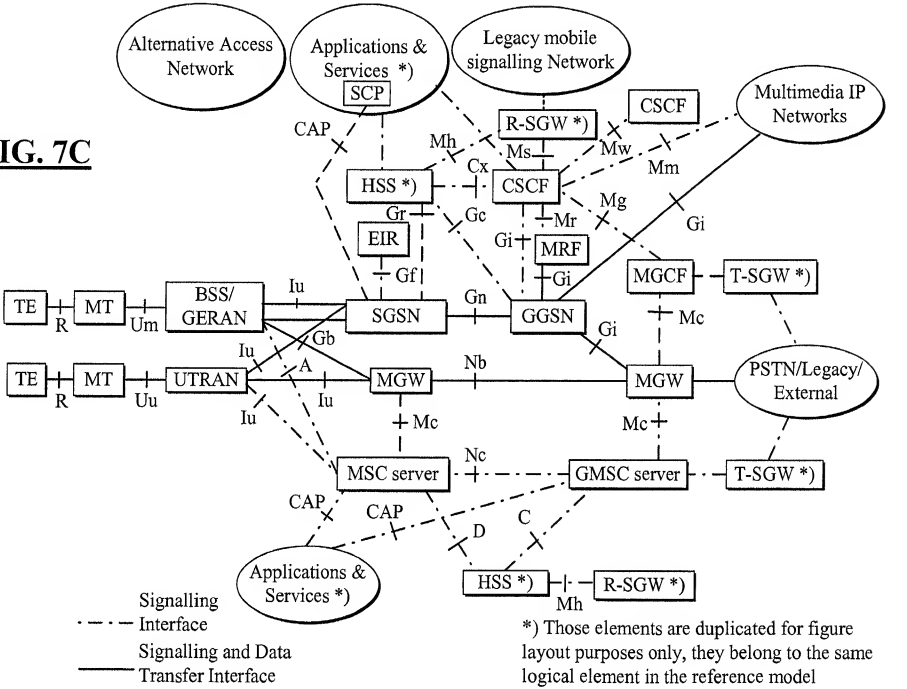
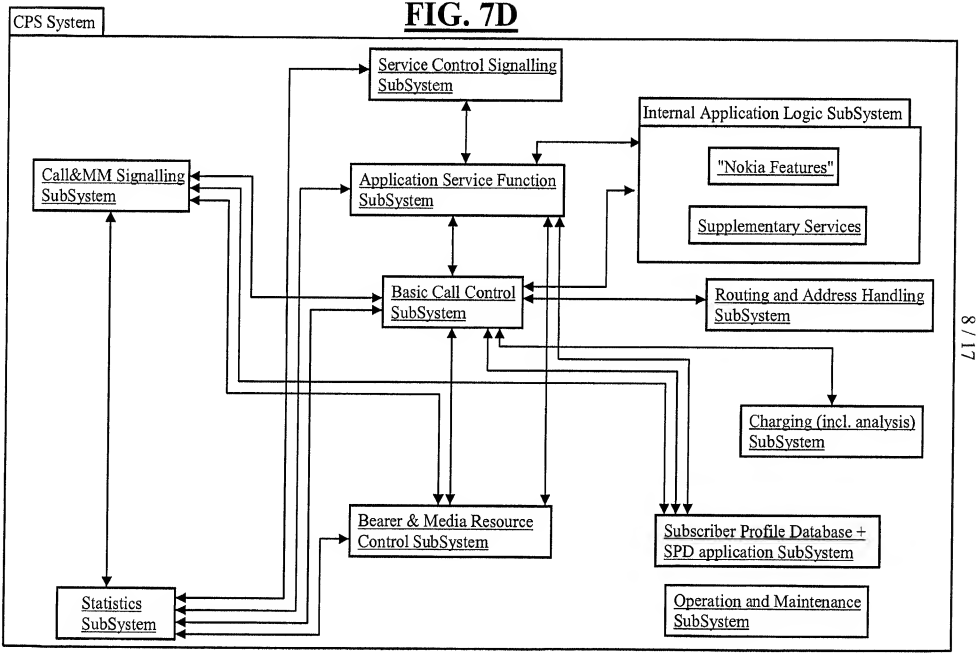
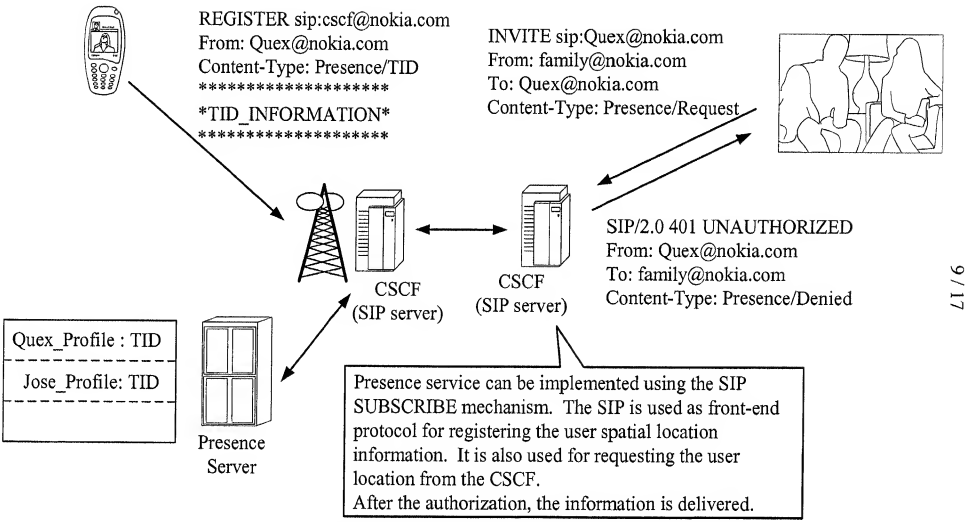


FIG. 7D





TID: Target Information Identifier gives the user location information based on GPS or other mechanism.

FIG. 8

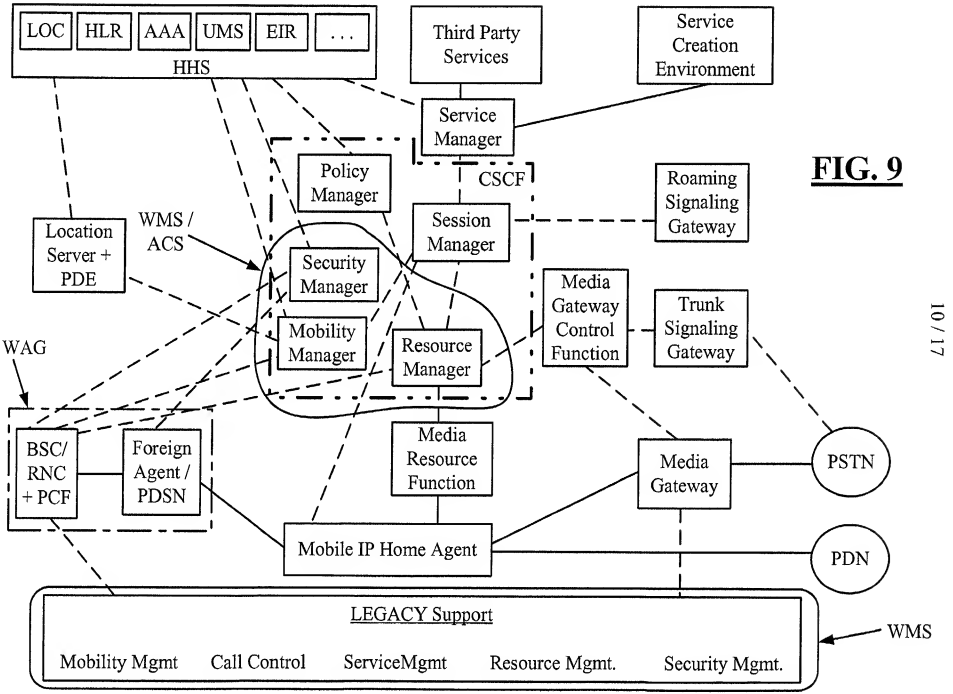
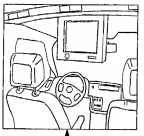

LOC
HLR
AAA
UMS
EIR
...
HHS
Third Party Services
Service Creation Environment
Service Manager
Policy Manager
CSCF
Roaming Signaling Gateway
Location Server + PDE
WMS / ACS
Session Manager
Security Manager
Media Gateway Control Function
Trunk Signaling Gateway
Mobility Manager
Resource Manager
WAG
BSC/ RNC + PCF
Foreign Agent / PDSN
Media Resource Function
Media Gateway
PSTN
Mobile IP Home Agent
PDN
LEGACY Support
Mobility Mgmt
Call Control
ServiceMgmt
Resource Mgmt.
Security Mgmt.
WMS

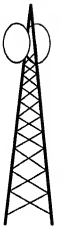
FIG. 9



REGISTER sip:cscf@nokia.com
From: Road-User@nokia.com
Content-Type: Presence/TID
****
TID_INFORMATION
****

INVITE sip:cscf@nokia.com
From: Road-User@nokia.com
Content-Type: Service-*Request*

SIP/2.0 200 OK
From: Road-User@nokia.com
Content-Type: Service-*Response*



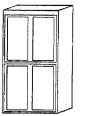
CSCF
(SIP server)

Request: Where is the closest Pizza-Centre to this TID?

Response: Pizza-Centre Address

Location-based Service Center

Register : TID



Presence Server

Presence service is used for obtaining location based services (LBS). SIP is used for registering the user spatial location. Then, the user can send a Service request. The answer is based on his actual location (TID).

FIG. 10

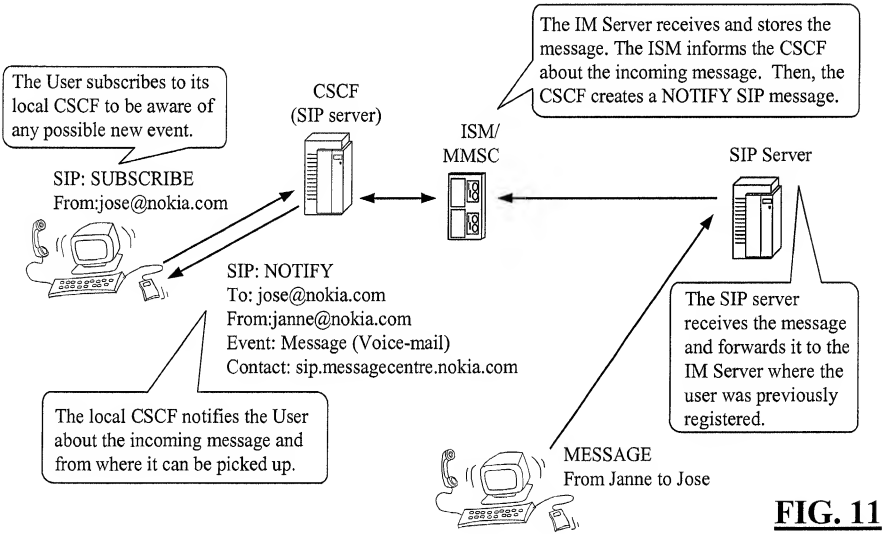

The User subscribes to its local CSCF to be aware of any possible new event.
CSCF (SIP server)
ISM/ MMSC
SIP Server
The IM Server receives and stores the message. The ISM informs the CSCF about the incoming message. Then, the CSCF creates a NOTIFY SIP message.
SIP: SUBSCRIBE
From:jose@nokia.com
SIP: NOTIFY
To: jose@nokia.com
From:janne@nokia.com
Event: Message (Voice-mail)
Contact: sip.messagecentre.nokia.com
The SIP server receives the message and forwards it to the IM Server where the user was previously registered.
The local CSCF notifies the User about the incoming message and from where it can be picked up.
MESSAGE
From Janne to Jose

FIG. 11

FIG. 12

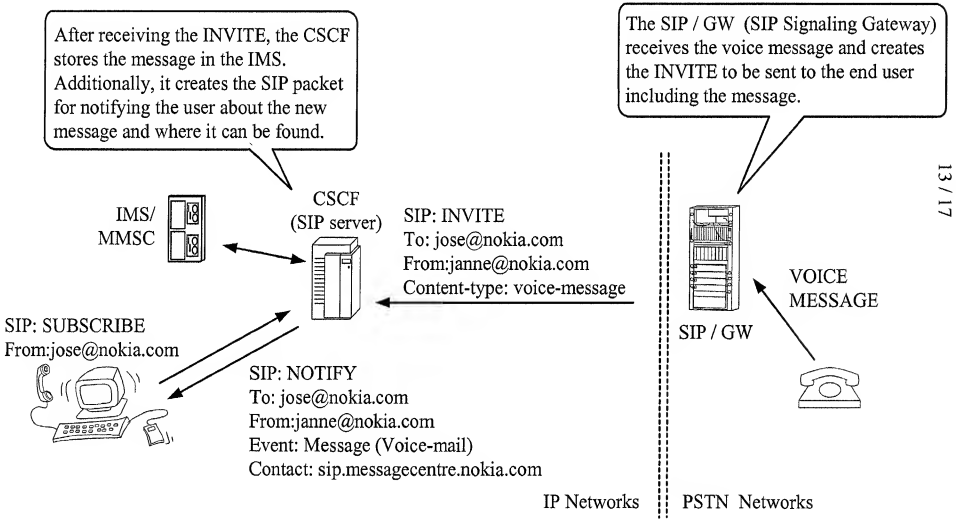
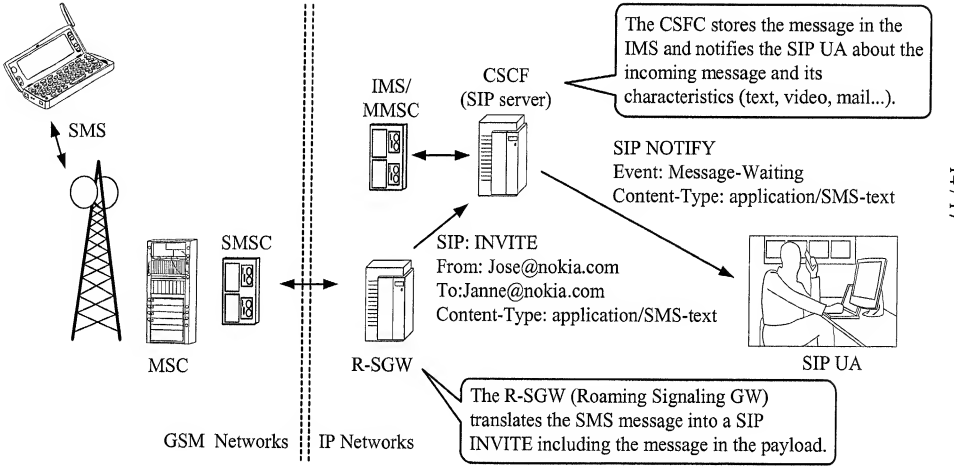

After receiving the INVITE, the CSCF stores the message in the IMS. Additionally, it creates the SIP packet for notifying the user about the new message and where it can be found.
The SIP / GW (SIP Signaling Gateway) receives the voice message and creates the INVITE to be sent to the end user including the message.
IMS/ MMSC
CSCF (SIP server)
SIP: INVITE
To: jose@nokia.com
From:janne@nokia.com
Content-type: voice-message
SIP / GW
VOICE MESSAGE
SIP: SUBSCRIBE
From:jose@nokia.com
SIP: NOTIFY
To: jose@nokia.com
From:janne@nokia.com
Event: Message (Voice-mail)
Contact: sip.messagecentre.nokia.com
IP Networks
PSTN Networks

FIG. 13



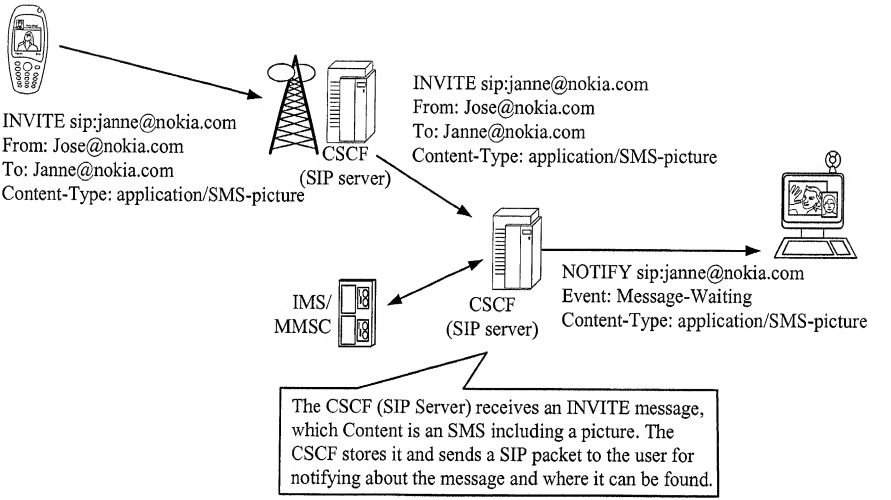

INVITE sip:janne@nokia.com
From: Jose@nokia.com
To: Janne@nokia.com
Content-Type: application/SMS-picture
CSCF
(SIP server)
INVITE sip:janne@nokia.com
From: Jose@nokia.com
To: Janne@nokia.com
Content-Type: application/SMS-picture
IMS/
MMSC
CSCF
(SIP server)
NOTIFY sip:janne@nokia.com
Event: Message-Waiting
Content-Type: application/SMS-picture
The CSCF (SIP Server) receives an INVITE message, which Content is an SMS including a picture. The CSCF stores it and sends a SIP packet to the user for notifying about the message and where it can be found.

FIG. 14

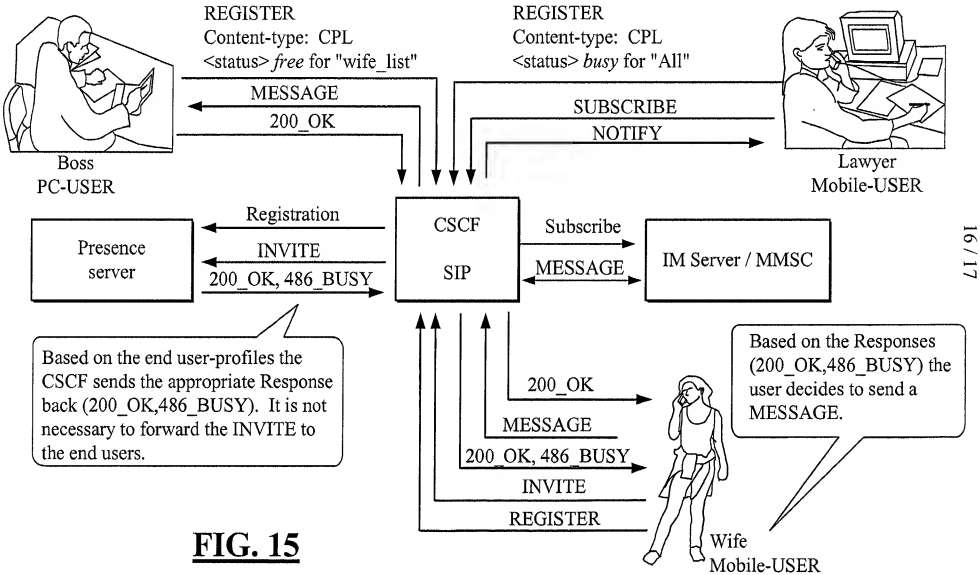

REGISTER
Content-type: CPL
<status> free for "wife_list"
MESSAGE
200_OK
REGISTER
Content-type: CPL
<status> busy for "All"
SUBSCRIBE
NOTIFY
Boss
PC-USER
Lawyer
Mobile-USER
Registration
INVITE
200_OK, 486_BUSY
Presence server
CSCF
SIP
Subscribe
MESSAGE
IM Server / MMSC
Based on the end user-profiles the CSCF sends the appropriate Response back (200_OK,486_BUSY). It is not necessary to forward the INVITE to the end users.
200_OK
MESSAGE
200_OK, 486_BUSY
INVITE
REGISTER
Based on the Responses (200_OK,486_BUSY) the user decides to send a MESSAGE.
Wife
Mobile-USER

FIG. 15

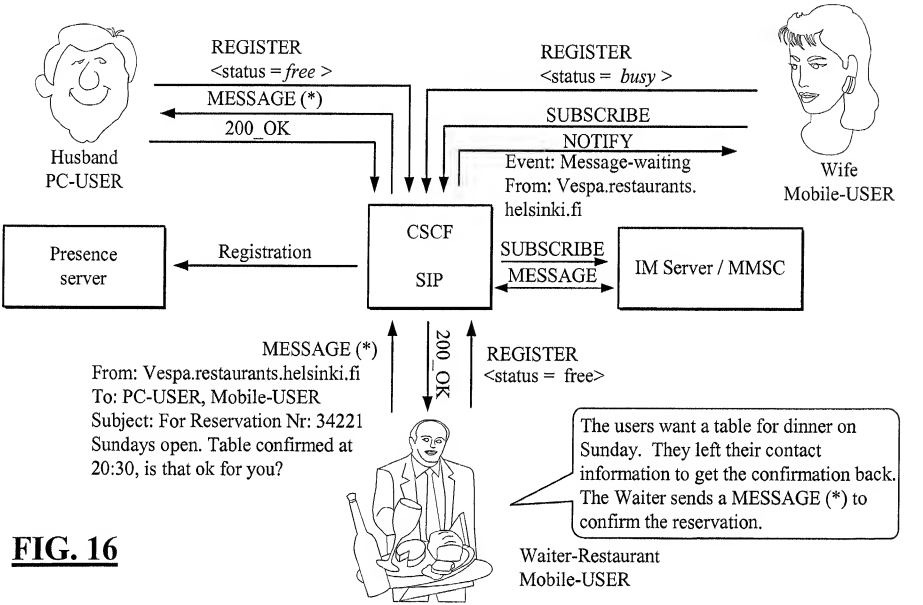

REGISTER
<status = free >
MESSAGE (*)
200_OK
Husband
PC-USER
REGISTER
<status = busy >
SUBSCRIBE
NOTIFY
Event: Message-waiting
From: Vespa.restaurants.
helsinki.fi
Wife
Mobile-USER
Presence
server
Registration
CSCF
SIP
SUBSCRIBE
MESSAGE
IM Server / MMSC
MESSAGE (*)
From: Vespa.restaurants.helsinki.fi
To: PC-USER, Mobile-USER
Subject: For Reservation Nr: 34221
Sundays open. Table confirmed at
20:30, is that ok for you?
200_OK
REGISTER
<status = free>
The users want a table for dinner on Sunday. They left their contact information to get the confirmation back. The Waiter sends a MESSAGE (*) to confirm the reservation.
Waiter-Restaurant
Mobile-USER

FIG. 16